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BOTANY.—*The history of kidney cotton.* FREDERICK L. LEWTON, U. S. National Museum.[1]

It is often difficult to determine the botanical identity of the cultivated forms of an important plant like cotton, on account of the extensive transport of seed from one country to another which has taken place, the changes brought about in these forms while adjusting themselves to the new conditions, and the results of natural or artificial crossing. In the case of cotton the meagre and incomplete descriptions of cotton plants usually given in books of travel, and found even in many botanical works, make it extremely difficult to trace the origin and distribution of a large number of distinct species and varieties. The type of cotton, however, known as kidney, chain, or stone cotton, in which the seeds of each cell adhere firmly together in the form of a kidney-shaped mass, instead of lying separated from one another enveloped in more or less cotton lint, has such a unique and constant character in its clusters of seeds that its identification in even very incomplete descriptions is a comparatively easy matter.

What appears to be the earliest account of this species was given by Jean de Lery[2] in his history of a voyage made to the land of Brazil in 1557, which was written in French and published in 1578. Under the name of John Lerius, his history was translated and reprinted by Purchas[3] in the fourth book of his "Pilgrimes." In this account Lerius tells of the Bom-

[1] Received October 30, 1920.

[2] LERY, JEAN DE. *Histoire d'un voyage fait en la terre du Bresil, autrement dite Amerique*, ed. 1, 208. 1578.

[3] PURCHAS, SAMUEL. *Purchas his Pilgrimes*, ed. 3, 4: 1333. 1625.

basin cotton shrubs with seeds "close joined and verie much pressed together after the form of a man's kidnie." He says it was known to the barbarians by the name of *ameniiou*, a name which is still used in practically the same form by the Tupi tribes of Brazil. L'Obel,[4] in 1576, endeavored to improve on the pictures of the Levant cotton published some years earlier by Fuchsius and by Matthiolus, by adding a figure of a cluster of seven seeds arranged in a kidney-shaped mass. He must have become familiar with the seed arrangement in Brazilian kidney cotton through material brought to Europe by traders or explorers, and thought that this was true of all cottons.

The earliest accurate description and illustration of kidney cotton seems to be that given in 1675 by Giacomo Zanoni,[5] who calls it "Bambagia arborea di Pernambuco." His figure is reproduced on the opposite page. This cotton, undoubtedly a native of Brazil and Guiana originally, was soon spread over the tropical regions of the world bythe aerly Portuguese navigators, and became thoroughly established in Africa, India, Siam, the Philippines, and many other countries. Sir Hans Sloane tells in 1696 of kidney cotton having been brought to Jamaica from Brazil by James Lancaster after the defeat of Pernambuco in 1594.

Julius Philip Benjamin von Rohr carried on in the island of St. Croix, between 1786 and 1790, a most extensive series of cotton experiments, an account of which he published in 1791 and 1793 under the title "Anmerkungen über den Cattunbau zum nuzen der Daenischen Westindeschen Colonien." He grew and examined as many kinds of cotton as he could obtain by travel in the West Indies and South America, and by the help of friends in other parts of the world. He made notes on the character and behavior of these cottons, recorded their yields, and carried out extensive breeding experiments and fertilizer tests. Rohr describes under the names Guiana cotton, Brazil cotton, and Porto Rico cotton, three types in

[4] L'Obel, Matthias de. *Plant. seu Stirp. Hist.*, 370. 1576.

[5] Zanoni, Giacomo. *Istoria Botanica*, 40–44. *Pl. 16*. 1675.

Fig. 1.—The earliest illustration of a plant of kidney cotton. From Giacomo Zanoni, Istoria Botanica, pl. 16. 1675.

which the seeds adhere together. The following are descriptions, condensed from Rohr, of three types of cotton which have their seeds adhering together in clusters:[6]

"*Guiana cotton*, the seed very black and rough like fine chagrin, those of each lock adhere together in the form of a long, narrow pyramid. The kind most prized in Europe on account of its whiteness, strength and length. Known in Europe as Cayenne, Surinam, Demerara, Berbice and Essequibo. Planted all over Guiana. This is the kind seen and described by all writers and travelers in this region. It does not do so well in the West Indies. Yields two harvests yearly. In Martinique called *coton á pierre*, in Jamaica, kidney cotton, also link cotton. Grows 10 to 12 feet wide if the ground is good. Nine to eleven seeds in each lock.

"*Brazil cotton*, the seed black and rough like those of Guiana cotton. The seed of each lock adhere together in the form of a short, broad pyramid. Only found in Brazil, imported into St. Croix by Dr. Peter Duncan. Seven and not over nine seeds in each lock. I have often found the seeds of the Guiana cotton in commerce, but never those of the Brazilian. After growing the Brazilian cotton in St. Croix, I saw no evidence of its changing into the Guiana kind.

"*Porto Rico cotton*, the seed in each lock adhere together in the form of a long, narrow pyramid, and are entirely covered with 'filz.' I have known this kind for a long time. Very much like the Guiana cotton in growth, size, shape of the tree and all its parts. It only bears with me once a year. For the planter the only distinguishing character is the entirely fuzzy seed. The wool is as hard to take off as that of the Guiana cotton."

The eccentric American botanist C. S. Rafinesque, in his "Sylva Telluriana," published in 1838, proposed Latin binomial names for the cottons described by Rohr.[7] For the Guiana and Brazil cottons he proposed the name *Gossypium guyanense* and distinguished them as varieties *verum* and *braziliensis*. For Rohr's Porto Rico cotton he proposed *Gossypium rohrianum*.

F. R. de Tussac, a French colonist who settled in the Island of Santo Domingo, and eventually lost his fortune there, pubished in 1808 to 1827 his "Flore des Antilles." In this work, devoted mainly to the botany and agriculture of the islands of Santo Domingo (Hayti), Martinique and Guadeloupe, the

[6] ROHR, JULIUS PHILIP BENJAMIN VON. *Anmerkungen über den Cattunbau zum nuzen der Daenischen Westindischen Colonien.* 1: 38–39, 45, 72–80, 120–121. 1791.

[7] RAFINESQUE, C. S. *Sylva Telluriana* 16, 19. 1838.

author describes one indigenous and four introduced species of cotton. Of one of the latter he speaks as follows:

"The culture of another species, which differs but little from the preceding, has been adopted by some colonists, it is called the Stone cotton, *Cotonnier pierre* (*Gossypium lapideum* Tussac), or cotton of Cayenne. In this species the seeds are strongly united together and form a little block which is easily separated from the wool. This is composed of very long and very strong filaments, and on this account it gains in weight what it loses in fineness."[8]

Fig. 2.—Seed clusters of two varieties of kidney cotton which were distinguished by Rohr (1791) and named by Rafinesque (1838).

a. The Guiana variety: Gossypium guyanense verum Raf.

b. The Brazilian variety: G. guyanense brasiliense Raf.

Original drawing from photograph of seeds planted in Arizona, 1908.

From the settlements of the Portuguese in India, and the activities of the East India Company in bringing seed from South America for planting on the coast of Coromandel and in Bengal before 1780, kidney cotton became thoroughly established in India, as shown by specimens in European herbaria collected by Dr. Hove as early as 1787. It thus attracted the attention of W. Roxburgh, who, in his "Hortus Bengalensis" of 1814, catalogs a species of *Gossypium* as *G. acuminatum*, but gives no description.[9] In Roxburgh's "Flora Indica," however, which appeared in 1832, he gives enough description to show that he intends this name for kidney cotton, the specific name "acuminatum" being chosen because of the "much pointed" capsules.[10] Roxburgh believed this cotton to be uncultivated and a native of northwestern India.

John Vaupell, an Englishman who traveled throughout Guzerat in western India in 1838, published[11] two years later an account of the cottons of that region, and mentions having found several

[8] TUSSAC, F. R. DE. *Flore des Antilles* 2: 67. 1818.

[9] ROXBURGH, W. *Hortus Bengalensis* 51. 1814.

[10] ROXBURGH, W. *Flora Indica* 3: 186. 1832.

[11] VAUPELL, JOHN. *Cottons of Guzerat*, Trans. Agric. Hort. Soc. Bombay. 1840.

unusual cotton plants growing in a temple yard at Sidhpoor. He planted seeds of these near Bombay, and obtained plants which he described as a new species under the name *Gossypium imbricatum*, from the imbricate arrangement of the seeds. In the meantime, however, John Graham, the superintendent of the botanical gardens of the Agri-Horticultural Society of Western India, in Bombay, published "A Catalogue of the Plants Growing in Bombay and its Vicinity," in which he described[12] under the name *Gossypium vaupellii* the cotton brought from Sidhpoor in Guzerat by Vaupell.

Two or three years before the names proposed by Graham and by Vaupell for this type of cotton were published, there appeared the "Flora of Jamaica" by James Macfadyen, founded largely on the work of Sir Hans Sloane. Under the name *Gossypium brasiliense*, Macfadyen gives a much better description of the kidney cotton than those appearing in earlier works, and says that "In the time of Sloane as well as in that of Edwards it was known by the name of Brazilian cotton."[13]

Since 1814 the following names have been published as applying solely to kidney cotton:

Gossypium lapideum Tussac, Fl. Antill. **2**: 67. 1818.
Gossypium acuminatum Roxb. Hort. Beng. 51, nomen nudum. 1814; Fl. Ind. **3**: 186. 1832.
Gossypium arboreum Vell. Fl. Flum. **7**: *pl. 49*. 1827. Not L. 1753.
Gossypium brasiliense MacFad., Fl. Jam. **1**: 72. 1837.
Gossypium perenne Blanco, Fl. Filip., ed. 1, 537. 1837.
Gossypium guyanense Raf. Sylva Tell. 16. 1838.
Gossypium vaupellii Graham, Cat. Plants Bombay and Vicinity, 15. 1839.
Gossypium imbricatum Vaupell, Trans. Agric. Hort. Soc. Bombay. 1840.
Gossypium conglomeratum Wiesner, Die Rohstoffe des Pflanzf., ed. 2, **2**: 236. 1903.

Of these, Tussac's name, although antedated by that of Roxburgh, is the first name which was associated with a description sufficiently clear to identify the species intended.

[12] GRAHAM, JOHN. *A Catalogue of the Plants Growing in Bombay and Its Vicinity* 15. 1839.
[13] MACFADYEN, JAMES. *Flora of Jamaica* **1**: 72. 1837.

Until such time as the Guiana and Brazilian forms shall be considered as constituting two distinct species, the scientific name of kidney cotton should be *Gossypium lapideum* Tussac.

PETROGRAPHY.—*Platinum in meteoric irons: a correction.*

Through a misreading of Dr. Mingaye's notes it was stated in the issue of this JOURNAL for June 4 last,[1] with reference to the Yenberrie iron: "This is the first reported case of platinum in an Australian meteorite." As a matter of fact platinum has become one of the well-recognized constituents of meteorites and has been detected by Dr. Mingaye himself in those of Barrata, Cowra, Delgate, Gilgoin, Molong, and Mount Dyrring.

GEO. P. MERRILL.

[1] This JOURNAL, 10: 315. 1920. Note *a* to Table I.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

GEOLOGY.—*The Mule Creek oil field, Wyoming.* E. T. HANCOCK. U. S. Geol. Survey Bull. 716-C. Pp. 19 (35–53), pl. 1, fig. 1. 1920.

The bulletin discusses an area containing two well-developed anticlines about 30 miles S. S. E. of the Black Hills, near the east edge of Wyoming in Niobrara County. Upper Cretaceous beds from the top of the Niobrara formation down into the Mowry shale are exposed, a stratigraphic thickness of about 1600 feet. The subsurface section, compiled from records of drill holes in this and adjacent areas, includes about 2700 feet of beds and extends 398 feet into the top of the Mississippian. Structure is represented by contours at 100-foot intervals. The two anticlines described lie along the general trend of the Hartville uplift, which connects the Front Range with the Black Hills, and strike nearly due north. The length of one anticline is about 4 miles, of the other more than 7 miles; the widths range from 2 to 5 miles or more. The dips average from 5° to 15°, reaching a maximum of 26°. No faults are noted. Active production in the field began early in 1919. The producing wells average 125 to 150 barrels and the total production of the field early in 1920 exceeded 1000 barrels a day, of a paraffin oil of low specific gravity. Tests on one of the anticlines had been unsuccessful when the report was prepared. The writer lays much stress as a possible oil horizon on what he calls the Newcastle sandstone, about 175 feet above the Lakota sandstone and 50 feet below the Mowry shale. In the discovery well he believes the productive sand is in the Lakota sandstone about 435 feet below the Newcastle sandstone. Testing for possible deeper sands had been carried into the "Red beds" (Spearfish formation, Triassic?) with the intention of going still deeper. M. I. GOLDMAN.

SCIENTIFIC NOTES AND NEWS

The American Ornithologists' Union met in Washington on November 9–11.

The seventh revised edition of the Smithsonian Physical Tables, after considerable delay due to printing difficulties, appeared in October. It contains about 100 more pages and 170 more tables than the sixth revision.

An Advisory Board on the subject of highway research, under the chairmanship of Dean MARSTON of Iowa State College, has been organized by the Engineering Division of the National Research Council. Money will be provided for a salaried technical director of the Board who will give his whole time to the work. The U. S. Bureau of Public Roads will coöperate in this work.

A cryogenic laboratory for the study of liquefied gases, including hydrogen and helium, is being installed at the Bureau of Mines. The laboratory will be under the direction of Dr. R. B. MOORE.

Contracts were let in November for the construction of five reinforced concrete buildings for the new Naval experimental and research laboratory to be established at Belleview, D. C., on the east bank of the Potomac River, south of Washington. The laboratories are to cost about $650,000. The funds are provided from a war appropriation authorized by Congress on the recommendation of the Naval Consulting Board.

An illustrated lecture on *The stereographic method as applied to photographic mapping and the apparatus used in connection therewith* was given in the auditorium of the Interior Department on Saturday, November 13, by Mr. N. SANDOR, of Jena, Germany, a representative of the International Stereographic Central, under the auspices of the Topographic Branch of the U. S. Geological Survey.

Mr. H. D. FOSTER has been appointed research associate at the Bureau of Standards by the Hollow Building Tile Association.

Dr. RALPH E. HALL, formerly of the Geophysical Laboratory of the Carnegie Institution of Washington, has resigned from the Firestone Rubber Company, of Akron, Ohio, to accept a position with the Koppers Company, manufacturers of by-product coke ovens, at Pittsburgh, Pennsylvania.

Mr. ELMER D. MERRILL, Director of the Philippine Bureau of Science, spent two weeks in Washington during November.

Mr. HARRY S. MULLIKEN, a consulting and metallurgical mining engineer of New York City, has been appointed technical assistant to the Director of the Bureau of Mines.

Dr. HIDEYO NOGUCHI of the Rockefeller Institute for Medical Research, New York City, gave a lecture at the National Museum at 4 p. m., Wednesday, November 17, on *Recent studies of yellow fever*. The lecture was given under the auspices of the Army Medical School.

Messrs. CHARLES RESSER and R. S. BASSLER of the National Museum have prepared an exhibit of fossil plants, arranged biologically, in the paleobotanical hall of the Natural History Building. This is the first systematic exhibition of its kind in the Museum.

Mr. BERT RUSSELL, formerly of the Patent Office, left the service of Prindle, Wright and Small of New York City on December 1, to accept a position with R. F. STEWARD, chemist and patent attorney, of Washington.

Messrs. P. S. SMITH of the U. S. Geological Survey, and E. A. HOLBROOK and O. P. HOOD of the Bureau of Mines, have been appointed by the Secretary of the Interior to serve on the American Engineering Standards Committee, of which the Department has become a member.

Mr. NELSON R. WOOD, for over thirty-two years a taxidermist in the National Museum, died on November 8, 1920.

ERRATA

VOL. 9, 1919

P. 668, second column, line 20....	For Frederick B. LaForge	read Laurence LaForge

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P. 15, line 4.....	For *drymifolia*	read *drimyfolia*
P. 35, line 25.....	For Wostor	read Wooster
P. 327, line 14 f. b.	For quenstedticerds	read Quenstedticeras
P. 339, line 15 f. b.	For COLVILLE	read COVELL
P. 413, Legend, Fig. 1.....	For Reflection	read Refractive
P. 498, line 6.....	For March 13	read February 28
P. 578, lines 28 and 33.....	For Ranier	read Rainier
P. 587, lines 28–30	This should read	"consisting of 100 specimens from Africa and 126 from South America, the latter being types of species described by Dr. Pilger, chiefly from the Andean region."

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An * denotes an abstract of a published paper. A † denotes an abstract of a paper presented before the Academy or an affiliated Society. A ‡ indicates an item published under the head Scientific Notes and News.

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